

Powerful learning environments in secondary vocational education

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Powerful learning environments in secondary vocational education: towards a shared understanding

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ARTICLE



Powerful learning environments in secondary vocational education: towards a shared understanding

Inge Placklé^{a,b}, Karen D. Könings^c, Katrien Struyven^{d,f}, Arno Libotton^{d,e},
Jeroen J. G. van Merriënboer^c and Nadine Engels^e

^aEducational Sciences, EDWE, Teacher education, MILO, Vrije Universiteit Brussel, Brussels, Belgium;

^bEducation, University College PXL, Hasselt, Belgium; ^cSchool of Health Professions Education, Department of Educational Development & Research, Maastricht University, Maastricht, The Netherlands; ^dEducational Sciences, EDWE, Vrije Universiteit, Brussels, Belgium; ^eEducational Sciences, EDWE, Teacher education, MILO, Brussels, Belgium; ^fSchool for Educational Studies, University of Hasselt, Hasselt

ABSTRACT

Stakeholders in vocational education have difficulties communicating and collaborating on the design of education because they often lack a shared understanding of what constitutes effective student learning. The aim of this study is to investigate whether the perspectives of teacher educators, teachers and students on good education in vocational education are aligned with what literature says about Powerful Learning Environments (PLEs) and to what extent the perspectives of different groups of stakeholders are mutually aligned. Results of nine focus group interviews showed that perspectives are mostly similar in the three groups. They strongly favoured authentic and challenging pathways, endorsed the importance of supporting opportunities for developing key competences and, although not univocal by students, adaptive teaching and learning support, within a positive and safe learning community. Differences between preferences of different stakeholders on some of the design characteristics of PLEs underline the importance of developing a shared understanding about learning and teaching among stakeholders.

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Introduction

Stakeholders have difficulties communicating and collaborating on the design of education, because they often lack a shared understanding (Penuel et al. 2015; Sirotnik and Goodlad 1988) of what constitutes good vocational education. To foster a common understanding on effective student learning in vocational education, shared perspectives of different stakeholders on the learning environment are important (Elen et al. 2007). Therefore, the aim of the current study is to investigate whether teacher educators', teachers' and students' perspectives on good education are aligned with what the literature says about Powerful Learning Environments (PLEs), and to what extent the perspectives of different groups of stakeholders are mutually aligned. Getting insight in each others' perceptions and preferences might be a starting point for the development

CONTACT Inge Placklé  ingeborg.plackle@vub.be  Educational Sciences, EDWE, Teacher education, MILO, Vrije Universiteit Brussel, Pleinlaan 9, Brussels 1050, Belgium

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of a shared vision (Wenger 1998) on how PLEs in vocational education ideally could be designed and implemented.

PLEs are situations and contexts for learning that aim at the development of complex skills and higher-order skills, deep conceptual understanding and metacognitive skills (De Corte 1990; van Merriënboer and Paas 2003). According to De Bruijn (2006), teachers in vocational education aim to develop PLEs including coaching, reflection, broad assessment and authenticity. One might expect that teacher educators have the most innovative vision of the stakeholder groups mentioned and that they would endorse the characteristics of PLEs and even model them in their practice. However, teacher educators form a broad category and there is sizeable variability in their conceptions of teaching (Donche and Van Petegem 2011). According to the limited number of studies available, many teacher educators prefer 'teacher control' over students' self-regulation while their practice reflects an information transmission approach to teaching (for an overview, see Lunenberg, Dengerink, and Korthagen 2014).

Students' perspectives of a learning environment determine their learning behaviour, and, consequently, the quality of their learning (Könings, Brand-Gruwel, and van Merriënboer 2005). From several studies it is known that student perspectives of the learning environment may differ significantly from their teachers' perspectives (e.g. Biemans et al. 1999; Den Brok, Bergen, and Brekelmans 2006; Fraser 1982; Fraser and O'Brien 1985). A recent study on differences between students' and teachers' perceptions of education (Könings, Seidel, and van Merriënboer 2014) identified student profiles varying in the extent to which they match teachers' perceptions. Students with the least shared perceptions with their teachers seemed to be considerably less motivated and performed worse compared to students whose perceptions are closer to their teachers' perceptions. If the aspirations of teacher educators and teachers are a very long way from how students conceive a learning environment that supports or hampers their learning, adaptation is needed of instructional strategies or the way these are framed for students. Thus, also student perspectives are central in mapping out preferable characteristics of PLEs in vocational education (Cook-Sather, Bovill, and Felten 2014).

In order to map out the stakeholders' preferences, we will give a brief overview of characteristics of PLEs in vocational education as described in the literature. The characteristics are grouped in four domains: (1) offering challenging learning pathways in authentic contexts, (2) providing opportunities for the development of 21st century skills, (3) giving adaptive support for teaching and learning, and (4) putting the student with his or her vocational identity at the centre of teaching and learning.

First, vocational learning pathways have to be challenging and meaningful (De Bruijn 2006; De Bruijn and Leeman 2011). Challenging pathways connect to students' lives (Rumberger 2012). They present authentic tasks, requiring challenging thought and allowing time for exploration (Smyth and Fasoli 2007). Authentic tasks, preferably performed in realistic contexts, can meet these requirements. When students are actively involved in learning activities, it is more likely that learning will be meaningful (van Beek et al. 2014).

Second, self-regulated learning and collaborative problem solving are 21st century skills in the heart of PLEs (De Corte 1990; Nelson 1999). Self-regulated learning implies that the learners take control of their own learning processes, including the stipulation of their own personal learning goals and the choice of appropriate learning activities (Kicken

et al. 2009). Nelson (1999) explicitly stipulated the importance of collaborative problem solving. Working in small groups and within reciprocal relationships, each student has opportunities to participate and learn from peers. At the end of the programmes in vocational education, students must be able to solve authentic problems occurring in their daily and vocational life, both individually and with peer support.

Third, adaptive teaching and learning support is seen as an integral part of learning and instruction. Students differ in cultural backgrounds, language, interests, values, socio-economic status, academic readiness and so forth. Vocational education should be tailored to this broad range of learners, offering attractive and challenging pathways to students with high potential, and at the same time trying to give those at risk of educational disadvantage equal access to reaching excellence (European Agency for Development in Special Needs Education 2013). To optimise the learning process for each student, adaptive education is needed (Tomlinson and Javius 2012). An adaptive learning environment is supportive, varied, meets preferences and needs of individual students, and is at the same time challenging and attractive for all (De Bruijn 2006). Teachers not only evaluate students' performance, but also students' needs and learning prerequisites (Friedricha et al. 2013). These strategies of adapting education have to be seen as an integral part of education that tries to improve learning of all students.

Fourth, the student with his vocational identity is situated at the centre of teaching and learning. Students want to make sense of their world and their place in this world (Tomlinson and McTighe 2006). As such they are looking for their personal meanings, roles and possibilities. The development of vocational identity is not only related to the development of professional knowledge and skills, but also to professional attitude and it is shaped both by personal desires, talents and values of students and the expectations of the labour market (Billett 2001; Kuipers and Meijers 2009).

Figure 1 below visualises the mapping out of stakeholder perspectives regarding PLEs in vocational education.

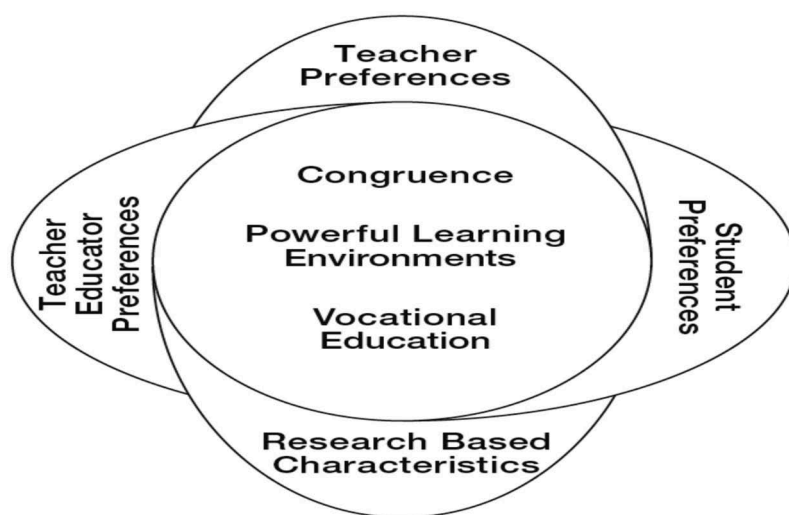


Figure 1. Mapping out stakeholders' preferences regarding PLE in vocational education.

Teacher educators, teachers and students may have their own preferences for learning environments, as visualised in [Figure 1](#). However, to foster a common understanding of what constitutes effective student learning in vocational education, teacher educators, teachers and students should ideally have shared perspectives of the learning environment (Elen et al. 2007). In this study we investigate whether their perspectives on good education are aligned with the characteristics of PLEs and we compare the perspectives of different groups of stakeholders.

We aim to answer the following research questions:

- (1) To what extent do teacher educators, teachers and students consider the characteristics of PLEs based on the literature as preferable in vocational education? Do they suggest additional preferable characteristics?
- (2) What are similarities and differences between the preferences of teacher educators, teachers and students?

Method

Context

This study was conducted within the context of the Project Integrated General Subjects (PGS) in Flanders. The aim is that students in vocational education are not only prepared to enter their professional and personal lives armed with the skills of their craft and the best possible literacy levels, but that they can also be successful in environments that require them to make choices, acquire, assimilate and use new information, collaborate with others, solve daily problems and, in doing so, regulate their strategies, emotions, and motivation. The underlying assumption is that more integrated approaches, starting from real-life problems and phenomena, facilitate the transfer of insights and competences to students' everyday personal, vocational and social reality. In line with these assumptions, curriculum developers in Flanders initiated PGS as a broad-fields integrated curriculum design in vocational secondary education. In PGS, functional maths, language as well as historical, scientific, economic and information-processing skills are integrated in a course that places a curricular emphasis on life challenges and social and/or vocational problems, and in which social resilience and social responsibility are simultaneously developed. Schools in Flanders are encouraged to integrate content that fits logically together in real life in both social and vocational contexts.

Participants

Teacher educators

We organised three focus group interviews for teacher educators ($n = 16$). They were invited through the newsletter of the Association of Teacher Educators Flanders. The first focus group ($n = 6$) was organised at the Conference of the Dutch Association for Teacher Educators and participation was voluntarily. Two participants were teacher educators in PGS, the others were involved in vocational education. All participants of the second ($n = 5$) and third focus group ($n = 5$) were teacher educators in PGS. Most of them were pioneers on developing the PGS curriculum for their teacher education college. The

teacher educators were associated to seven different colleges spread over the country. Most of them were holding a master degree, two a professional bachelor degree. Participants were aged 26 to 55 years, 6 male and 10 female.

Teachers

We organised two focus group interviews for PGS teachers in vocational education. With the exception of one male teacher, all participants ($n = 5$; $n = 6$) were female teachers aged 22 to 42 years. All of them had a professional bachelor of education degree and were trained as secondary school teachers. Only 3 of them were specifically trained to teach PGS as a subject.

Students

Two schools offering internships to student teachers agreed to organise four focus group interviews with 49 students ($n = 12$, $n = 12$, $n = 11$, $n = 14$) during their regular PGS lessons. Twelve students were in their 3rd or 4th year of secondary education, 37 students in year 5 or 6. Students were aged 14 to 19 years. Their fields of study were Care, Office Management, Food and Metal.

Materials

During the discussions, we used flash cards with quotes referring to eight characteristics of the four domains, described in the Introduction and presented in the left column of Table 1. For the students, the wording was slightly adapted to the target group. The self-developed quotes were used to serve as a trigger for the discussion among the participants.

For the teachers and the teacher educators, the flashcard with the quote on, for example, 'differentiation' said:

In vocational education addressing the diversity in the group of learners is a must! THE vocational student does not exist!

For the students, the quote on 'differentiation' was:

The vocational student does not exist! We are all different; teachers must deal with the differences among us!

Table 1. Overview of presented characteristics to teacher educators, teachers and students.

Characteristic		Teacher educators and teachers	Students
(1) Challenging pathways	Authentic	X	X
	Challenging	X	X
(2) 21st century skills	Self-regulation (incl. Reflection)	X	X
	Collaboration	X	X
	Problem solving	X	X
(3) Adaptive teaching and Support	Evaluation for learning	X	
	Differentiation	X	X
(4) Vocational Identity	Vocational identity	X	

Note. Characteristics discussed with teachers and teacher educators were identical and therefore included in one column.

In addition to text quotes and to trigger less verbally oriented participants, for students a varied set of approximately 60 pictograms and pictures of nature, objects, art, and so forth was provided to trigger their thinking on what they perceived as ‘good’ education.

Procedure

The researcher first asked the teachers and teacher educators to explain what they consider as good education in secondary vocational education, with a focus on PGS. They were also asked to define the concept of PLE in their own words. As soon as the discussion threatened to fall silent, flash cards with quotes were presented. The quotes were used to serve as a trigger for the discussion among the participants. [Table 1](#) gives an overview of the presented characteristics.

The researcher distributed the flashcards among the participants and each participant had a few minutes to individually prepare a first reaction on paper. The researcher asked them to reflect on own experiences related to the topic of the quote. Every participant who prepared a first reaction to one quote started the discussion about this quote, inviting others to comment. Thus one by one the quotes were brought up for discussion.

The focus group interviews with the students took place during their normal PGS classes. The students were informed about the main aim of the study. It was explained that they are very important stakeholders in their education, so it is important to hear their voice in order to improve education in vocational education. Students in vocational education have a lower self-esteem then students in academic streams (Van Houtte, Demanet, and Stevens 2012). Therefore, the researcher showed confidence in the ability of the students to explain their insights. In order to support students to express their preferences, metaphors, photos and drawings were integrated in the discussions.

In a first phase, the researcher asked the students to brainstorm on positive and negative experiences during their lessons. A ball of yarn was tossed from student to student thus forming a large spider web of yarn. Each time the one receiving the ball completed the sentence ‘*Top in the lessons I find ...*’. The same was repeated with ‘*Flop in the lessons I find ...*’. The researcher asked reflection-stimulating questions about the web and its relation with good education, for example: ‘Regarding to the web, you shared a lot of experiences of your lessons. What can we learn on that regarding good education in vocational education?’

In a second phase, every student chose one of the 60 pictograms and pictures that represented his or her idea of ‘the ideal lesson’ best. Students elaborated on their ideal lesson, followed by a conversation on what they consider good education to look like. Finally, the same procedure as for teachers and teacher educators was used for the discussion of flashcards.

Because of time limitations (lessons of 90 minutes) the characteristics ‘vocational identity’ and ‘evaluation for learning’ were not systematically discussed.

Data analysis

The conversations were audio taped and transcribed verbatim for coding, theme searching and interpretation. The coding, identification of emergent themes and interpretation process were supported by qualitative data analysis software, AtlasTi.

In a first round, ‘descriptive codes’, summarising primary topics of excerpts, and ‘in vivo codes’, using participants’ own language, were used. Analytic memos were written in order to enhance accountability and the depth and bread of findings (Saldana 2011). Multiple codes were applied to the same text if the content referred to more than one topic. In the next round codes were organised in categories and key themes were identified. Finally, patterns were searched for: Similarities and differences in the perceptions of teachers, teacher educators and/or students; big ideas, and correspondence (i.e. themes related to other themes) (Saldana 2011).

Results

Table 2 below represents a compressed display of the answers to the research questions: To what extent do teacher educators, teachers and students consider the PLE characteristics from the literature as preferable in PGS (Research question 1), and what are similarities and differences between the preferences of these stakeholder groups (Research question 2). Overall, the framework offered a fairly fit with the majority of the responses of the participants. Only one new characteristic had to be added: A positive and safe atmosphere.

A lot of attention and time was devoted in every focus group discussion to themes related to *challenging pathways*. Next to ‘authentic’, other subthemes emerged: ‘intellectually challenging’, ‘functional’, and ‘widening horizons’. Particularly the importance of the authenticity of the learning environment was highlighted. In his description of the ideal PGS-lesson, one student insisted on the significance of genuine curiosity in real situations as a trigger for learning:

I like to ask myself questions about things and search for the answers in the places where these things occur and learn from it in that way. To experience it myself, sinks in better. (FG 4, ST5)

Among teachers and teacher educators, opinions on what counts as ‘authentic’ varied from learning based on real life challenges, for example, organising events for elderly people or soccer tournaments in a refugee centre by students, to learning based on realistic but invented case descriptions.

While teacher educators in general preferred real life challenges and took the view that they themselves should provide opportunities for authentic learning in teacher education too, some of the teachers were more double-minded. These teachers were doubtful about the benefits for acquiring the specified targets, or about their own ability to help students in vocational education learn from such activities. A teacher expressed her concern:

Often, teachers don’t evaluate authentic learning and students don’t experience that they did learn. How could evaluation of authentic learning experiences reflect what they have learnt, and what will be the next step? (FG 8, T1)

Teacher educators, teachers and students in each focus group emphasised that a learning environment has to be intellectually challenging. The following quote by a teacher educator illustrates this aptly:

I’m in favour of pushing the limits a little and working with challenging learning materials. Challenge them to think! They really are able to do so, although sometimes with strange turns of thought and certainly not according to the book. But they can be creative. I would never come up with some of the answers they give. (FG 3, TE 3)

Table 2. Overview of stakeholders' preferred PLE characteristics: Similarities and differences with research-based characteristics of PLEs.

Characteristics introduced by the researcher or introduced by stakeholders	Students	Teachers	Teacher educators
Challenging and authentic learning environment			
<i>Authentic / integrated curriculum</i>			
<i>Real situations on location</i>			
<i>Realistic cases</i>			
<i>Intellectually challenging</i>			
<i>Functional for daily or professional life</i>			
<i>Widening horizons</i>			
Opportunities 21st century skills			
Self-regulation			
<i>Metacognitive skills</i>			
<i>Students making choices</i>			
<i>Scaffolding self-regulated learning</i>			
Reflection and reflective dialogue			
Collaboration			
Problem solving			
Adaptive learning support			
Differentiation			
Evaluation for learning			
<i>Coaching dialogue</i>			
(Vocational) identity development			
Positive and safe atmosphere			

	Aligned preferences with literature		Diverging opinions with literature		Not discussed or no reaction
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Students claimed the right to be treated as capable young people. One of them phrased it like this:

... high expectations are mandatory! Some of us have their problems but it doesn't mean we are stupid! Each one of us is good at something. It's important that they notice it. (FG 4, ST 8)

However, one of the teachers emphasised that students in vocational education do not by default seek to be intellectually challenged. Wrapped in a story about students asking her for 'simple lessons' she referred to the cultivated lethargy of students who are no longer used to be challenged.

All respondents endorsed the standpoint that learning in vocational education should be made relevant to the learners' life and work context. Yet the definitions of what is relevant may vary. Students emphasised above all the functionality for daily life and work although some of them also reported to be interested in learning about different cultures. Teachers and teacher educators agreed that preparing students for everyday personal, vocational and social reality is an important task in vocational education. Several teacher educators were not satisfied with this narrow interpretation of meaningful content for vocational education. They emphasised the importance of taking people beyond their everyday experiences, of widening their horizons and adding to their cultural capital. Referring to ten years of experience in teaching PGS, one teacher educator said that she gradually discovered that:

Students in vocational classes can be quite fascinated (...), and very open to arts, culture, music, film, literature ... Functional language and math skills, information processing skills, etc. can be learned just as well within inspiring authentic contexts beyond students local circumstances. (FG 3, TE 3)

Teachers agreed that 'in theory' widening students' horizons should be an important task for PGS, but then varied in their opinions on whether it is possible to get vocational students interested in a curriculum that may be experienced as 'not belonging to their everyday life'.

In general, teacher educators, teachers and students favoured authentic and challenging pathways.

When we consider *opportunities for the development of 21st century skills*, self-regulated learning was indisputably considered as an important characteristic of PLEs among students, teachers and teacher educators. Subthemes that emerged were metacognitive regulation skills (goal setting, planning, making choices, self-monitoring), scaffolding self-regulated learning, reflection and reflective dialogue.

The students were ardent defenders of open learning tasks, setting their own goals and finding their own ways to the answers they are interested in. Teachers and teacher educators were convinced of the necessity to scaffold students' learning process on their path to self-regulation and commented how necessary but difficult it is to let go, as a teacher explained:

A teacher who 'lets it go' doesn't know sometimes where he ends. There is something in our DNA that obstructs 'letting go. (FG 9, T1)

Teachers (FG 9) talked about the balance between letting students control their learning environment and at the same time providing structure and guidance where needed. 'Letting go' is insufficient and could be a pitfall as a teacher educator stated:

What happens? They can do whatever they like! All the structure disappears, but in fact they need a lot of structure ... Students need sufficient and good guidance to develop self-regulated learning competences, and this is often what is missing. (FG 2, TE 4)

Teachers and teacher educators were well aware of the importance of reflection even if they were not sure on how to set up reflective dialogues with students. Students themselves were less keen on reflection. Some students were primarily interested in practical answers to (for them) practical questions and said to drop out when it comes to reflection on learning processes, as a student stated:

You want ask to a baker how long he worked on that pastry and what he had done to make it?! Don't you? (FG 5, ST 6)

Students, teachers and teacher educators all supported collaborative learning. Students emphasised the importance of the social context for learning, as a student explained:

Together we can reach a lot. We need each other, helping each other, taking a cue from the other.' (FG 4, ST 7)

All teacher educators and teachers acknowledged the importance of teaching problem solving in vocational education. A teacher educator described it as follows:

Of course, students must learn how to solve problems! If you reduce them to performers, then you are pampering them. Students need to be able to do more than just cutting vegetables. It's better that they try-out a recipe and think creatively. (FG 3, TE 3)

Most students recognised that problem solving is part of their job, but they indicated they solve problems in a different way than students in general education. A student explained:

While they thought about what could be the problem, we already went to the roots, directly to the cause of the problem. (FG 4, ST 10)

Thus, this student indicated that certain phases of a thoughtful problem solving process, such as identifying and analysing the problem, were wasted on him.

The discussion about problem solving showed coherence with the discussion about self-regulated and collaborative learning. The importance of this coherence is mentioned by teacher educators:

In fact, by setting up a reflective dialogue you should bring the students to their own solutions and very important that they form a consensus through dialogue. There will be discussions or disagreements, but they'll come to a solution. (FG 3, TE2)

In sum, self-regulated learning, collaborative learning and problem solving were preferable characteristics of PLEs in vocational education, in perspective of teacher educators, teachers and students. Students strongly preferred to be responsible for their own learning.

Teacher educators and teachers emphasised the need for *adaptive learning support*. Teacher educators accentuated the importance of teachers' willingness and ability to observe and recognise the diversity among learners.

A starting point of differentiation has to be the willingness to optimise the learning process of each learner, as a teacher educator stated:

I think it will be a big step if people see the needs of learners and are willing to search for ways to adapt their education to meet those needs. Today, that is missing a little bit ... Teachers learned to think from their subject, not from the perspective of the learner. (FG 1, TE 2)

The student opinions on differentiation were ambiguous. For example, a student chose a pictogram with a ladder to symbolise good education in vocational education:

I want to climb! Anyone can be on another step, but each of us must be able to climb! (FG 4, ST 7)

On the first part of this quote, there was agreement between students. Students themselves embraced challenging education that keeps them growing, but discussing their practice, there was less consensus. About half of the students in the focus groups found differentiation not 'fair':

unfair, others may do fun things, everybody has to do the same. (FG 7, ST 5)

Also 'evaluation for learning' was considered an important characteristic by teachers and teacher educators. Teachers involved students in the evaluation process by selecting criteria for good learning together; some teachers used student portfolios or weblogs to document a broad range of competences of their students. They argued the evaluation is in line with the integrated approach of PGS and gives opportunities to give immediately feedback.

Every focus group discussion of teachers and teacher educators addressed the importance of coaching of the learning process. Teacher educators and teachers highlighted 'dialogue' between teacher and student and between students as an important characteristic.

So, discussion on adaptive teaching and learning lived intensely during the focus group discussions by all stakeholders. Students showed an ambiguous attitude towards differentiation. Within coaching, the importance of 'dialogue' was highlighted.

Vocational identity was a new topic for the teachers and teacher educators of all focus groups. After defining this characteristic for them it was also considered to be important, but one that is hardly given conscious attention to at present by teachers and teacher educators.

Career guidance is a way to develop vocational identity by students. Therefore, we visit the public employment service. (FG 8, T 3)

Although we did not explicitly present the characteristic vocational identity to students, they kept emphasising throughout the focus groups how important it is for them that their talents and strengths are recognised:

It is better to look at our talents and skills and use them in projects, together with the students of mean stream. Our input could be valued because we are very handy. (FG 5, ST 8)

A *positive and safe atmosphere* was not initially introduced as a topic in the focus groups. Yet, students and teachers in all focus groups highlighted the importance of a positive and safe atmosphere as a necessary condition to create a PLE:

Everyone should feel good and feel 'I have achieved something'. Look at us from a positive perspective, we are all different – some of us have their problems-, but every one of us has strengths. Put that in the picture! (FG 3, ST7)

Teachers also underlined the importance of their efforts for the well-being of their students:

The relationship with your students is crucial. Students need to feel well. There has to be an atmosphere of mutual trust where it is ok to make mistakes. Therefore, I share a piece of myself. Together with my students, we are on our way. (FG 8, T 2)

Discussion

Teachers, teacher educators and students were invited to describe their preferences regarding learning environments in vocational education, by asking an open question about their preferences and by means of flashcards referring to the literature-based characteristics of PLEs. Do teacher educators, teachers and students consider the literature-based characteristics of PLEs as preferable in PGS?

Overall, their preferences coincide with the characteristics 'authentic and challenging pathways' and 'development of 21st. century skills such as self-regulated learning, problem solving and collaborative learning'.

Although teachers and teacher educators fully endorse the importance of 'adaptive learning support', this characteristic is seen as more controversial by students. Teachers and teacher educators are less familiar with the characteristic 'vocational identity development' but appreciate its importance. Furthermore, 'positive and safe environment' was introduced by stakeholders as a necessary characteristic of the canvas on which a PLE can be brought to life. Even if in general the stakeholders prefer the constructivist characteristics of PLEs, it is important to pay attention to the more detailed differences in preferences in order to develop a sustained framework for PLEs in vocational education.

The way the stakeholders interpret 'a challenging and authentic environment' deserves our attention. While students want to be intellectually challenged, it is important to them that learning is connected to real life situations. That does not mean that they want learning to be restricted to functional skills for their daily and professional lives. Teacher educators urge, along the same track, the necessity to broaden students' horizons. Students agree but connecting it to meaningful, preferably real-life experiences is essential for them. The teachers on the other hand feel more safe with tasks based on realistic cases within the school walls and doubt whether real-life experiences necessary produce effective learning. Moreover, they are not united on students' interest in intellectually challenging tasks and their readiness to broaden their horizons.

Students seem to be interested in action and not in forethought, problem analysis or reflection afterwards. Yet, teachers and teacher educators underline that it is important to metacognitively scaffold self-regulation strategies and problem-solving. That students find this unnecessary might indicate that there is a problem with the metacognitive scaffolding, that was hardly included in learning tasks (Jossberger 2011; Putwain, Nicholson, and Edwards 2016).

More profound differences in perspectives are found when it comes to 'adaptive learning support'. Perspectives towards differentiation were not univocal. This is in line

with findings from Könings, Brand-Gruwel, and van Merriënboer (2007). Perspectives are related to what stakeholders consider as 'fair': Students find that each of them should be able to make progress within his or her own pace, but sometimes struggle to accept the way differentiation takes shape in the classroom, where additional exercises, optional activities or lengthened instruction may be felt as rewards or punishments. This could be due to the approach to differentiation used by teachers (Placklé et al. 2017). Although, teachers and teacher educators stress the importance of differentiation, they mainly focus on diverse remedial instruction activities, while thoughts about a pedagogy based on the diverging needs and strengths of learners from the start, were lacking. Differentiation still seems to be addressed in some curricula as a practice to appeal to when 'regular' approaches fail. In contrast, previous research indicates that when differentiation is implemented as an integral part of learning, students respond more favoured to it (Hattie 2012; Joseph, Thomas, Simonette, and Ramsook 2013).

Although teacher educators and teachers consider the development of a vocational identity is important, they did not spontaneously discuss this characteristic for PLEs. This is in line with previous research (Meijers, Kuijpers, and Bakker 2006) suggesting that there is a lack of attention for the development of a vocational identity in vocational education. Conversations on vocational identity are most often non-dialogical and confined to providing information about the vocation (Winters 2012). Students emphasise their professional pride, but that is not enough; setting up a real reflective dialogue on professional experiences is necessary (Kuipers, Meijers, and Gundy 2011; Mittendorff et al. 2008).

Do the stakeholders have additional preferable characteristics? The focus group discussions lead to adding a 'positive and safe learning environment' that supports all learners (Rubin 2006) as a characteristic that serves as the background for all other design principles. Previous research did not describe this as a characteristic of PLEs in vocational education, so we did not include it in our guiding theoretical framework. An optimal classroom culture is characterised by warm and supportive teacher-student and peer relationships, appropriate expressions of emotion, respectful communication and problem solving, strong interest and focus on tasks, and supportiveness to individual differences, building on students' strengths, abilities and needs (Jennings and Greenberg 2009; La Paro and Pianta 2003). It is remarkable, that this characteristic mainly originated from the students and teachers in our study, while being hardly discussed by the teacher educators, although it is important for student teachers to learn how to create a positive and safe learning community. Such a culture does not come about by coincidence, but has to be intentionally built up and embedded in the structure of teaching and learning in every way (Hattie 2012; Shernoff 2014).

Our findings have implications for a theory of PLEs in vocational education. Based on our results, we developed a shared research-based framework that could serve as the foundation for building up a shared understanding and a common vision of PLEs in vocational education (Stein and Coburn 2008). The assumption is that such a common framework might help to improve educational practice and reform by building bridges between research and practice (Coburn and Penuel 2016), and acknowledging the perspectives of the different stakeholders involved in realising a PLE. The framework aims to visualise the various characteristics that, together and in interaction, improve the learning of every learner. Figure 2 presents the characteristics for PLEs found relevant



Figure 2. Model for powerful learning environments in vocational education (PoLEVE) (Placklé et al. 2014).

in vocational education: Authentic and challenging learning tasks, a focus on 21st century competences, and adaptive learning support are postulated as key design principles to appeal to, within a positive and safe learning environment. The student, with his vocational identity, is situated in the middle of the Figure, as the centre of teaching and learning.

The findings have practical implications on redesigning curricula in vocational education. It can be argued that the current core curriculum in vocational education that focusses predominantly on functional skills needs to be revised in order to provide more intellectually challenging and horizon-extending learning experiences for vocational students. A challenging curriculum with ambitious content and high expectations is important, regardless of academic track (Darling-Hammond 2004). This starts with efforts of teacher educators with regard to focussing on social justice (Torff 2011) and work on the teacher beliefs about the importance of developing PLEs for all students. Evenmore, teacher educators and teachers need to learn how to think from the learner's perspective, with a focus on their capacities, interests and preferences and how these could be deployed to optimise active and interactive learning might help prospective teachers to design learning environments that improve the knowledge of each learner and are perceived as such. In addition, when teachers explicate the adaptive approach

they use, assuming that they create a positive and safe learning community wherein differences are common and can be discussed and effectively dealt with (Tomlinson 1999), students could value the benefits of effective adaptive education. Besides, it might be relevant to involve students more explicitly in the design of learning activities (Cober et al. 2015; Cook-Sather, Bovill, and Felten 2014) and explain why problem solving, self-regulated learning strategies and differentiated instruction are relevant.

The PoLEVE model can be considered as a first step to develop a shared understanding among stakeholders on the design of PLEs in vocational education. To further align stakeholders' perspectives, not at least these of teachers, placement supervisors at the workplace, teacher educators, and researchers, we recommend long-term inquiry-based collaboration with the purpose to co-design PLEs, put them to the test, investigate design and implementation problems and find solutions – preferably in dialogue with students (Placklé 2017; Cober et al. 2013; Coburn, Penuel, and Geil 2013; Coburn and Penuel 2016). In Flanders, such partnerships are established in 'inquiry-based schools' (Willegems et al. 2016).

The study at hand has its limitations. The main researcher was at the same time PGS-teacher educator. She was an insider on the topic, which can be an advantage, but could also have caused an influence on the analysis of the data. Recognising this possible researcher bias, the data were structured around sensitising concepts, based on scientific literature, the process was monitored based on continuous reflection and self-criticism. Examples of quotations from participants were used to confirm the connection between the results and the original data (Elo et al. 2014). Another restriction was that not every characteristic of PLEs was discussed in every focus group, because of the limited time available on the part of the students. The focus groups took place during their regular PGS classes (90 minutes). Therefore, the characteristics 'vocational identity' and 'evaluation for learning' were not systematically (i.e. in every focus group) discussed.

Because the focus groups were semi-structured discussions, participants' opinions may have been influenced by what others said. To minimise this limitation, every participant prepared his/her opinion on a separate quote beforehand and brought that into the discussion. In the focus groups with students, some voices could be underexposed. Therefore, the conversations in these groups were supported by approaches that helped students to express their preferences (metaphors, photos and drawings).

Another limitation pertains to the generalisability of the findings. The context of this study was the course PGS that integrates the different academic disciplines in vocational education in Flanders. We have to be careful to generalise the findings towards vocational education in general, which also includes practical subjects, different streams, and internships.

We did not involve vocational practitioners and local communities as stakeholders. Learning within authentic learning environments incorporates a collective responsibility with vocational practitioners and the local community (Zeichner 1991). Future research and practice should also involve their voice.

Teachers, teacher educators and students agree on most literature-based characteristics of PLEs. The student, with his vocational identity, forms the centre for the design of vocational pathways, which appeal on authentic and challenging learning tasks, addresses 21st century competences, and offers adaptive learning support. These principles are embedded within a positive and safe learning atmosphere. Differences between

preferences of different stakeholders on some of the design characteristics of PLEs in vocational education underline the importance of co-design and developing a shared understanding about learning and teaching among stakeholders.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Inge Placklé is a teacher educator in the Multidisciplinary Institute of Teacher Education at Vrije Universiteit Brussel and in the Department of Education at PXL-University College in Belgium. She educates aspirant teachers for general subjects in vocational secondary education. She is the head of the Flemish Association for Teacher Educators. Her research areas are equal learning opportunities, learning environments in vocational education and professional development of teacher educators.

Karen D. Könings is an associate professor in the Department of Educational Development and Research, Faculty of Health, Medicine & Life Sciences at Maastricht University, the Netherlands. Her research focuses on student and teacher perspectives on education, and participatory design as an approach to account for different perspectives of stakeholders in the educational design process.

Katrien Struyven is an associate professor at Hasselt University and at Vrije Universiteit Brussel in the Educational Sciences Department. Her research focuses on differentiated instruction, student-centered and cooperative teaching methods and new modes of assessment in education.

Arno Libotton is an Emeritus Professor in Educational Sciences and Teacher Education at Vrije Universiteit Brussel. He is promotor and/or coordinator of research and development projects at university, national and international level.

Jeroen J. G. van Merriënboer is holding a chair in Learning and Instruction. He is research program director of the Graduate School of Health Professions Education at Maastricht University.

Nadine Engels is head of the Multidisciplinary Institute of Teacher Education at Vrije Universiteit Brussel. Her interests and expertise are mainly teacher learning and teacher development across the professional lifespan, collaborative teacher research and issues of diversity and equity.

ORCID

Karen D. Könings  <http://orcid.org/0000-0003-0063-8218>

Katrien Struyven  <http://orcid.org/0000-0002-6562-2172>

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